

# IRON ORE – A VITAL RAW MATERIAL FOR STEEL

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Iron Ore is an abundantly available mineral in the world. 5% of the earth's crust, which has a continental depth of 0-75 kms., contains Iron Ore. It is a basic raw material for Iron and Steel industry which provides foundation for industrial development of a nation. In India iron ore resources are quite substantial and as the mining intensifies following more demand, there is more exploration and discovery of more resources. An idea of Iron Ore resources can be had from the following table of reserves.

The above resources are with a cut off grade of +55% Fe and roughly estimated upto 50 meters depth with a grid interval of more than 500 meters. If the cut off grade is reduced to, say, 40-45% Fe content, the resources will simply double.

However, the above resources do not include around 1000 million tonnes of Haematite Iron Ore recently discovered by the Director of Mines and Geology, Chhattisgarh in Kabirdham district. Further, since the Steel plants have large areas under captive mines, there is hardly any exploration activity undertaken by them. If MECL is asked to do detailed exploration in the captive mines of TISCO and SAIL alone, I am sure another 5000 million tonnes of Haematite ore will be added to the country's resources.

## PRODUCTION

It will be observed that the ratio of fines to lumps at the time of mining itself has been increasing on an average of 1% every year. Further, lumps to fines ratio differs from State to State. If we take concentrates and fines together, in Goa only 18% comes in the shape of lumps and 82% as fines and concentrates. In Karnataka, fines and concentrated together constitute 67% of the total production of Iron Ore, in Jharkhand it is 62% fines and 38% lumps and in Chhattisgarh, fines constitute 54% and lumps 46%. It is only in Orissa that 56% of

## RESERVES

Qty.: Million tonnes

Grade	Resources as on 1.1.1980	Production between 1980-1990	Resources as on 1.4.1990	Production between 1990-2000	Resource as on 1.4.2000	Production between 2000-05	Resource as on 1.4.2005
Haematite	11469		12197 (+728)		11426 (-771)		14630 (+3204)
Magnetite	6095		10590 (+4495)		10682 (+92)		10619 (-63)
<b>TOTAL</b>	<b>17564</b>	<b>470</b>	<b>22787 (+5223)</b>	<b>656</b>	<b>22108 (-679)</b>	<b>532</b>	<b>25249 (+3141)</b>

Figures in parenthesis indicate decrease(-)/increase(+) in resources

Source: Indian Bureau of Mines, Nagpur

the ore comes as lumps and 44% as fines. In the country as a whole, 59% of the production is in the shape of fines and concentrates in 2005-06 as against 41% as lumps. Another 10-15% becomes fines at the time of converting it into sized ore (CLO), handling at mines, railway stations and ports. In other words 70-75% of the total production is fines.

### INCREASE IN PRODUCTION DUE TO DEMAND FROM CHINA

Almost the entire increase in Iron Ore production has been fueled by demand from China. The mines which were closed in Chitradurga-Shimoga area in Karnataka and Redi in Maharashtra were opened up and the mines in Bellary-Hospet, Eastern sector and Goa which were operating sub-optimally started their operations at optimal level. The fines which were lying at the mine heads having no domestic demand also found an export outlet. This resulted in more availability of lumps required by secondary steel producers in India.

**Export imperative :** Since the secondary Steel producers require closely sized lumps, it became imperative for India to export fines for which China provided us a golden opportunity.



Commenting on the imperative of exports, the Working Group on Steel Industry for the Eleventh Five Year Plan (2007-2012) in its report submitted to the Planning Commission in December, 2006 observed that :

“Bulk of the export of Iron Ore is in the form of fines (over 80% in 2004-05) for which adequate sintering or pelletisation capacities do not exist in the country. Such capacity has to be built up through appropriate fiscal incentives”

The exports resulted in the opening up of ports which were closed such as Karwar, Bellikeri, Redi, Kakinada and Haldia and enhancing the capacities at Chennai, Goa, New Mangalore and Visakhapatnam ports.

### LACKADAISICAL GROWTH OF STEEL INDUSTRY

While the iron ore industry is well poised to respond to the demand, domestic Steel industry is woefully lagging behind in adding to the Steel production. Steel production in India is increasing at a Snail's pace as will be clear from the following table:

The primary producers with captive mines as a whole have increased Steel production in 2006-07 (April, 2006-January, 2007) by 0.9% over last year as against the secondary producers who increased their production by 14.2% over the corresponding period last year, making a total contribution of

### Captive mines no guarantee for increased production of Steel

(Million tonnes)

Primary Producers	2004-05	2005-06	2006-07 (April, 2006 – January, 2007)
SAIL(7 Plants)	12.46	13.47 (8.11%)	11.15 (-4%)
TISCO	4.10	4.73 (15.37%)	4.18 (7.6%)
RINL	3.45	3.50 (1.45%)	2.89 (-2.6%)
<b>Sub-total-I</b>	<b>20.01</b>	<b>21.7 (8.45%)</b>	<b>18.22 (0.9%)</b>
<b>Secondary Producers-I</b>			
EAF	10.23	11.27	10.80 (7.4%)
IF	8.24	8.69	8.00 (10.5%)
<b>Sub-total-II</b>	<b>18.47</b>	<b>19.97 (8.12%)</b>	<b>18.80 (14.4%)</b>
<b>Grand Total</b>	<b>38.49</b>	<b>41.66 (8.24%)</b>	<b>37.02 (7.3%)</b>

**Note:** Figures in parenthesis indicate %age increase/decrease over previous year

**Source:** JPC Bulletin - February, 2007

51% to the total crude steel production in the country.

It will thus be observed that in India the companies are only making announcements for setting up steel plants in Orissa, Jharkhand and Chhattisgarh without much ground level activities. Even Tata's expansion plan in 2007-08 is only to increase crude steel production by 3 lakh tonnes. The intention of steel companies seems to beguile the public and the Government to assume that India is fast catching up with China.

**Usage of Iron Ore :** Iron ore is always utilized as a blend of various grades to make it a useable product for various modes of Steel making. All over the world, 62-62.5% Fe content iron ore is used as a feed for blast furnace, in India, unfortunately, +63% Fe content on an average is a feed in the blast furnace. The best grade hard lumpy Iron Ore of +65% Fe in a closely sized form of 5-18 mm, commonly known as calibrated lumpy ore (CLO), is utilized in India by DRI/sponge Iron units. It is unfortunate that we use the best grade of Iron Ore for a product which is intermediary and a substitute for scrap.

Even otherwise the Indian Steel industry uses more lumps vis-à-vis other countries as will be clear from the following table for the year 2005-06:

**Percentage of lumps used by integrated Steel producers**

(In million tonnes)

Company	Lump	Fines	Total	% Lump
Tata	3.02	5.47	8.49	35.57
SAIL	7.2	16.80	24	30.00
ESSAR	1.34	3.06	4.4	30.45
ISPAT	1.97	1.89	3.86	51.04
JSW	0.97	3.70	4.67	20.77
RINL	2.18	4.01	6.19	35.22
<b>Total</b>	<b>16.68</b>	<b>34.93</b>	<b>51.61</b>	<b>32.32</b>

Source: Balance sheets, industry information, book hunt

Overall, percentage of lumps in total Iron Ore consumption in India is more than 37% as against 20% in China and South America, 15% in Europe and CIS countries, and 10% in North America. As Business Standard in its editorial on 13 June, 2007 has observed that “to use only lumps and sell the fines is to skim the cream and sell the rest, which is not what you would do if you were seeking to conserve a precious resource.”

The Working Group on Steel Industry for the Eleventh Five Year Plan (2007-2012) has recommended that the Steel

makers will also have to take necessary initiatives to reduce lump ore consumption and change the Iron Ore consumption mix with adequate technological changes by higher utilization of fines through sintering. It will be necessary for the Indian Steel producers to make larger use of fines and concentrates instead of remaining over dependent on lumps.

The use of more lumps rather than fines is because of the abundant areas available with the integrated steel companies and their selective mining. Since the area is large they can afford to indulge in profligacy and use lumps. This is part of the reasons of large stockpile of fines lying at the mine heads.

**DEVELOP WORLD CLASS IRON ORE MINES - ONLY ALTERNATIVE**

This leads me to the subject of developing iron ore as an independent resource industry which is not adjunct, as it is now, to Steel industry. If the iron ore mines are captive to the steel plants, mining plays a second fiddle to the steel industry.



Unlike other countries in the world, Indian Steel industry has been having captive mines as a colonial hangover with the result every new steel plant insists on having captive mines. Countries like Japan, South Korea, EU and China do not have captive mines. They ensure supplies through - equity participation, long-term contracts and annual price negotiations. Captive mines lead to selective mining because of enormity of lease area and minimal investment in exploration and mine development. No or less than optimal utilization of fines and low grade ores since it involves beneficiation cost distortion of market and breeding of inefficiency. There is no benefit to steel users as well as consumers of finished products, because the price at which the steel is sold in the domestic market is more than the international price.

**Distortion of market :** Captive mines have led to distortion of market in India: The steel plants with captive mines have generated enough surplus by selling Steel in domestic market at more than international price. Instead of increasing production in India, they are procuring even sick Steel plants such as Corus in Europe which does not have any captive mines. They therefore help in maintaining employment in foreign countries. They would take semis and flats from India to make better grade steel abroad rather than in India. Exports of semis and flats is even worse than exporting iron ore since 70% of the energy consumption is till the stage of semis and flats. Another Steel producer with captive mines is even developing mines and Steel plants in Bolivia to give tough competition to Indian iron ore exports in the next five years which will affect

employment in Indian mines and help in creating more jobs in Bolivia. Even the steel plants without captive mines have generated enough surplus to acquire Algoma steel plant in Canada and Minnesota steel in US.

**Case for world class Iron Ore mines :** In practical terms, value is created at mining stage and added at steel making stage. By treating iron and steel making as two separate activities and promoting both, combined (created and added) value would be higher than what would be obtained by making one activity subservient to the other. In the context of India, the margin between domestic cost and sale price is absorbed by the steel companies without any benefit to the user or downstream industries who could also procure steel in international market. In fact depriving the iron ore mining industry the full value of its production which it can utilize in exploration and mine development amounts to inter-sectoral subsidy to the steel industry.

Looking to the experience and examples of Australia, Brazil, South Africa and others, it is necessary to promote and develop world-class iron ore resource industry which will develop resources in a proper, scientific and sustainable manner and cater to the requirements of all consumers. There are many advantages:

- world class iron ore mining operations will generate more wealth and infrastructure in mining areas, situated in

backward and tribal areas.

- selective mining will stop, prolonging the life of the resources.
- provide uniform grade of iron ore at competitive rates.
- exploration with modern techniques will intensify, leading to the discovery of more resources.
- lead to zero waste mining utilizing high and low grade iron ores as per requirements of users.
- facilitate R&D work in mine related areas leading to
- development of expertise in various disciplines of mining and equipments required therefor
- export of expertise abroad as in the case of Western Australia which exports more than A\$ 2 billion worth of R&D services and equipments world-wide every year.

It would thus be fair to conclude that no captive mines should be granted to any Steel plant because it breeds inefficiency and amounts to inter-sectoral subsidy resulting either in inefficiency in Steel plants or absorption of extra profits by them. There is also no benefit to Steel consumers or to society who use finished products because the domestic Steel companies sell steel at a price higher than the international price. Development of independent resource industry will lead to more exploration, more scientific mining discovery of more resources, proper and systematic utilization of mined out material.



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